

REMARKS

Claims 1-17 are all of the claims that have been examined. By this Amendment, claim 18 is cancelled as being directed to a non-elected invention, which the Examiner withdrew from consideration. Applicants reserve the right to file a divisional application drawn to claim 18 in due course. New dependent claim 19 is hereby added.

The objection to the disclosure and the 35 U.S.C. §112, second paragraph, rejection should be overcome by the foregoing editorial amendments.

Claims 1, 10-14 and 17 are rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Watanabe et al. (U.S. Patent 4,682,641) (hereinafter "Watanabe"). This rejection is respectfully traversed.

Watanabe shows in Fig. 2 a tire manufacturing apparatus in which an unvulcanized tire (green tire) 5 shown in phantom line is mounted on rollers 11 and subjected to a groove carving operation by means of cutters 83, 84 (col. 4, line 52, to col. 5, line 2). Watanabe describes that the grooves that are carved in the unvulcanized tire are a quasi pattern of grooves 86 (Fig. 5) which are substantially complementary to the shaping surface of a vulcanizing mold. This means that the grooves 86 formed in the tread surface of the green tire 5 are given a shape complementary to the lug groove ribs that form the shaping surface of the vulcanizing mold.

In contrast to the above, the method claimed in amended claim 1 sets forth the step of forming carved grooves (8) at positions in a tread surface (4) of said green tire corresponding to said lug grooves such that the carved grooves extending in substantially the same direction as said lug grooves and that each of the carved grooves (8) has substantially a triangular shape (8a + 8b) widening gradually from a side of a tread center (TC) to a side of a tread end (TE), as most clearly shown by way of example in Fig. 3 of the instant application. The step of forming such a carved groove of a substantially triangular shape is not taught or suggested by Watanabe.

A reason why grooves of triangular shape are carved in the present invention will be explained. The vulcanization mold has an interior surface having lug groove forming ribs that protrude inward. A green tire is introduced into the vulcanization mold for carrying out a vulcanization-molding. In this case, a considerable amount of rubber of the green tire is removed because the lug groove ribs protruding into the molding cavity of the mold cut into the tread surface of the green tire. Moreover, the protruding lug groove ribs exert a pressing force to a belt member provided inside the tread rubber of the green tire so that the belt member tends to be waved to cause the so-called "belt wave" as shown in Fig. 7 of the instant application. This phenomenon is described in the 3rd to the 5th paragraphs on page 1 of the instant specification.

The above problem can be eliminated by preliminarily carving triangular grooves in the tread surface of the green tire. The triangular grooves facilitate smooth insertion of the lug groove ribs into the carved grooves, when the green tire is being introduced into the vulcanizing mold, and prevent creation of the pressing force that tends to cause the "belt wave."

The Examiner cites Clayton (U.S. Patent 4,237,955) and Verdier (U.S. Patent 3,457,981) with regard to the shape of the grooves. However, these references do not show triangular grooves. The most important thing to note is that these references show the shape of completed tire grooves and not the shape of grooves to be carved before the vulcanization of green tires. It is to be noted that the shape of grooves of completed tires has nothing to do with the shape of carved grooves of green tires before vulcanization since the shape of carved grooves of green tires has a specific meaning as discussed above.

It is apparent that the other references cited by the Examiner fail to teach or suggest the above-stated specific shape of the carved grooves.

It will, therefore, be apparent that the references cited by the Examiner do not anticipate or render obvious the method of the invention as presently claimed.

Regarding claims 10-12, the Examiner is apparently unable to find any specific teaching of the ratio of the volume and depth of the carved groove to the volume and depth of the lug groove, but he takes the position that this is obvious since Watanabe teaches that the carved grooves are substantially complementary to the lug grooves. On the other hand, in col. 6, lines 46-48, Watanabe indicates that “the quasi pattern of grooves 86 differ from the specific details of the shaping surface of the vulcanizing mold.” Thus, there is simply no teaching or suggestion anywhere in Watanabe of the specific ratios recited in claims 10-12, since it is not clear to what degree the grooves 86 differ from the “specific details” of the shaping surface of the vulcanizing mold.

Regarding claims 13 and 14, the Examiner has failed to identify even one prior art reference that teaches or suggests a belt member having the claimed expansion rate.

Reconsideration and allowance of this application are respectfully requested. If the Examiner believes that there are any outstanding issues that may be resolved through a personal or telephonic interview, he is respectfully requested to contact the undersigned attorney at the local telephone number listed below.

AMENDMENT UNDER 37 C.F.R. §1.111
U.S. SERIAL NO. 09/633,336

ART UNIT 1733
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A Petition for Extension of Time with appropriate fee accompanies this document.
Please charge any additional fees due (except the Issue Fee and/or the Publication Fee) to our
Deposit Account No. 19-4880.

Respectfully submitted,



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APPENDIX

MARKED VERSION SHOWING CHANGES MADE

IN THE SPECIFICATION:

The specification is amended as follows:

Page 7, 12th and 13th full paragraphs:

Hereinafter, an embodiment of the present invention will be described with reference to Figs. 1 to 8. The embodiment relates to manufacturing of an ORR tire (off the [use] road radial tire) for a large-sized construction vehicle.

As shown in Fig. 8, the ORR tire 1 comprises a carcass [b2] 2 consisting of a radial cord layer as a foundation, a belt 3 wound round the carcass 2, and a tread 4 wound round the belt 3 covering a crown section and a shoulder section.

Page 8, 3rd full paragraph:

In Figs. 2 and 3 showing a part of surface of the tread 4, TC and TE denote a tread center and a tread end, respectively. And Fig. 2 shows a carved groove 8a formed on the surface of the tread 4 using the cutter Ca. The carved groove 8a is formed so as to elongate from a position

distant from the tread center TC by a distance d (neighborhood of a closed end point P of a lug groove 9 (see Fig. 6)) to the [dread] tread end TE substantially in direction of the lug groove (direction inclined about 30 degrees to an axis of the tire).

IN THE CLAIMS:

The claims are amended as follows:

Claim 18 is cancelled without prejudice and/or disclaimer.

1. (Amended) A method for manufacturing a pneumatic tire in which a green tire having tire components assembled is charged in a mold for vulcanization-molding and lug grooves are formed on a tire tread surface within the mold by lug groove ribs provided on an inner surface of the mold, said method including previously forming carved grooves at positions on a tread surface of said green tire corresponding to said lug grooves [extending] such that the carved grooves extend in substantially the same direction as said lug grooves and that each of the carved grooves has substantially a triangular shape widening gradually from a side of a tread center to a side of a tread end.

14. (Amended) A method for manufacturing a pneumatic tire as claimed in claim 13, wherein expansion rate of said belt member is 3% [and] or less.

15. (Amended) A method for manufacturing a pneumatic tire as claimed in claim 1, wherein a full-mold vulcanization-molding machine having an upper mold and a [lwer] lower mold is used as a mold for vulcanizing and molding said green tire.

17. (Amended) A method for manufacturing a pneumatic tire, comprising:
a step of manufacturing a green tire in which [ribbon-like or sheet-like] extruded rubber having the shape of a ribbon or a sheet is piled up on a ply and a belt member assembled on a drum to form a tread;

a step of forming a carved groove on a tread surface of said green tire in direction of a lug groove; and

a step of charging said green tire formed with said carved groove in a vulcanization-molding machine to carry out vulcanization-molding so as to form a vulcanized tire having the lug groove.

New claim 19 is added.